ISSN. 2338-7475
E-ISSN. 2620-7869
Hearty
Jurnal Kesehatan Masyarakat
Beriman, Tulus, Sepenuh Hati,Berbesar Hati, Jujur, Sehat dan Kuat
Vol. 13 No. 2, April 2025, Hal. 522-529

FACTORS RELATED TO MINOR INJURIES IN CONSTRUCTION WORK FROM THE PERSPECTIVE OF OCCUPATIONAL HEALTH AND SAFETY

Berlian Totti Viala *, Bayu Yoni Setyo Nugroho
Public Health Study Program, Faculty of Health, Universitas Dian Nuswantoro
Jl. Imam Bonjol No.207, Pendrikan Kidul, Kec. Semarang Tengah, Kota Semarang, Jawa Tengah 50131, Indonesia
Email: *411201902859@mhs.dinus.ac.id*

Abstract

Construction accounts for one-third of all workplace fatalities, and construction workers have six times the risk of dying on the job compared to other sectors. Minor injuries are significant contributors to workplace accident records, with factors such as overtime and lighting playing a role. The objective of this study is to analyze the factors associated with minor injuries. The research utilized a quantitative approach with observational analytical methods, conducting a cross-sectional survey. A questionnaire was used to gather data on characteristics, overtime hours (standard of 4 hours), minor injuries, and lighting measurements (LUX Meter) with a standard of 100 lux at PT. Adhi Karya's Glapan Timur Irrigation Rehabilitation Project. The sample consisted of 53 respondents. The results of lighting measurements showed that 28 respondents (52.8%) were exposed to lighting intensity "Below Standard" and 25 respondents (47.2%) were exposed to lighting intensity "Within Standard." There was a significant relationship between lighting and the incidence of minor injuries among construction workers, with a p-value of 0.021 and an OR = 3.750. Additionally, there was a relationship between overtime and the incidence of minor injuries, with a p-value of 0.025 and an OR = 3.630. Both independent variables were associated with minor injuries.

Keyword : Minor Injuries, Lighting, Overtime Work

Introduction

The rate of construction accidents continues to be a source of concern on a global scale. The construction sector has a higher rate of fatal accidents compared to other industries. Construction accounts for one-third of all workplace fatalities, and construction workers are six times more likely to die on the job than in other sectors.(1) Among the various types of work-related injuries and fatalities in the construction industry, those related to construction equipment are the leading cause in the United States.(2)

Workplace accidents do not occur suddenly; they are categorized into two types: major injuries and minor injuries. According to data from the International Labor Organization (ILO), workplace accidents happen every day. The losses due to workplace accidents are estimated to cost AUD 60.6 billion for recovery expenses. The recovery costs are generally borne by workers, the government, and society.(3) According to the Occupational Safety and Health Administration (OSHA), out of 5,333 worker fatalities in 2019, 1,061, or approximately 20%, occurred in the construction industry.(2) Additional data on accidents shows that out of 23,464 injuries in the construction industry observed between 1980 and 2010, 15,972 were minor injuries and 7,492 were major injuries. Nearly half of all injuries involved construction workers under the age of 30.(4)

Submitted: August-2024 Received: January-2025 Available Online: April-2025

Regulations concerning overtime are outlined in the Fair Labor Standards Act in the United States, which stipulates that any hours worked beyond 40 hours in a week must be compensated at least 1.5 times the regular hourly wage. Some company agreements set the standard workweek to 8 hours per day/40 hours per week.(5) However, many construction jobs operate with standards of 10 or 12 hours per day. According to Government Regulation No. 2 of 2022 on Job Creation related to overtime provisions, overtime can be performed for a maximum of 4 hours per day and 18 hours per week.(6)

Overtime is defined as hours worked beyond 40 in one week, and it is a common experience, especially over the past 5-10 years. Workers have reported that what constitutes overtime can vary from contractor to contractor, from one job to another, from union to non-union workplaces, and even from one trade to another. There is also variation in how workers are compensated for their overtime work. (7)

Lack of sleep has received much attention and discussion across all industry groups. The topic of working long hours, particularly at night, can disrupt one's sleep schedule. The further impact of sleep deprivation is very dangerous, especially at the end of longer shifts and in hot temperatures.(8) Research conducted by the production department in 2019 showed that poor lighting at work contributed to 49.3% of workplace accidents

The results from a preliminary study at the site revealed that minor injuries included iron scratches, being hit by or struck by tools like hammers, dry hands after casting, and tripping over materials at the worksite. This study aims to identify the factors associated with minor injuries among construction workers.

Method

This quantitative research employs an observational analytical method with a cross-sectional study design. A questionnaire was used to assess characteristics, overtime hours (standard of 4 hours), minor injuries, and lighting measurements (LUX Meter) with a standard of 100 lux at PT. Adhi Karya's Glapan Timur Irrigation Rehabilitation Project. The sample consisted of 53 respondents. The study was conducted from November 2022 to June 2023 and has passed ethical review by the Health Research Ethics Committee of Dian Nuswantoro University with number 368/EA/KEPK-Fkes-UDINUS/III/2023.

Result

The results of the univariate analysis from the study include age, length of employment, and overtime hours, as detailed in Table 1. The results from the determination of points for lighting calculations are shown in Figure 1.

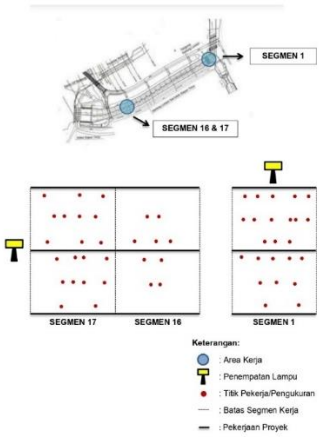

Figure. 1 Lighting Measurement Layout

Data collection was conducted from 7:00 PM to 10:00 PM WIB. Workers who received lighting intensity meeting the standard were 25, while 28 workers had lighting intensity below the standard, i.e., less than 100 lux.(9) According to the Minister of Public Works and Housing Regulation No. 10 of 2022, the required lighting intensity for night overtime work in the construction field should be more than 100 lux.

Table 1. Respondent Characteristics

Characteristics	**n** = (Total Sample)	%
Old (Year)		
18-30	20	37,7
31-61	33	62,3
Length of Employment (Year)		
01 – 10	21	39,6
11 – 20	12	22,6
21 – 30	14	26,4
31 – 40	6	11,3
Overtime Hours (Hours)		
3	12	22,6
4	18	34,0
5	23	43,4

Based on the frequency distribution results, it shows that the dominant variable for overtime work is that workers perform night overtime work at the "Standard Compliance" level (56.6%). Overtime work at the East Lumpur Basin project site meets the standard because the project's activity was not very high during the distribution of the questionnaire. However, there are 43.4% of workers who work overtime beyond the standard.

Table 2. ***Minor Injury***

No	Question	Never		Occasionally		Often		Very Often		Total	
		F	%	F	%	F	%	F	%	F	%
1	I have experienced minor workplace accidents (injuries) while working	2	3,8	31	58,5	19	35,8	1	1,9	53	100
2	I have stumbled while working.	9	17	18	34	20	37,7	6	11,3	53	100
3	I have been struck by tools while working	1	1,9	22	41,5	22	41,5	8	15,1	53	100
4	I have been scratched by iron during rebar installation	3	5,7	13	24,5	30	56,6	7	13,2	53	100
5	I have been hit by falling objects or tools while working	25	47,2	23	43,4	5	9,4	0	0	53	100
6	I have sprained my ankle while working	29	54,7	23	43,4	1	1,9	0	0	53	100
7	I have injured my hand due to the use of work tools	7	13,2	26	49,1	18	34,0	2	3,8	53	100
8	I have been pinched by iron materials	1	1,9	16	30,2	30	56,6	6	11,3	53	100
9	After the casting process, my hands felt hot and dry	0	0	4	7,5	24	45,3	25	47,2	53	100
10	While doing rebar work, I experienced scratches on my hands	0	0	16	30,2	19	35,8	18	34	53	100
11	I have been punctured by wire materials in my hands or feet	7	13,2	25	47,2	18	34	3	5,7	53	100
12	Kepala saya pernah terbentur oleh sisa material ketika melakukan pekerjaan penggempuran	25	47,2	17	32,1	11	20,8	0	0	53	100
13	My head has been struck by leftover materials while performing compaction work	0	0	9	17	31	58,5	13	24,5	53	100
14	I have slipped and fallen while working	31	58,5	22	41,5	0	0	0	0	53	100

Question 14, "I have slipped and fallen while working," shows that 58.5% of respondents predominantly did not experience slipping while working. Question 7, "I have injured my hand due to the use of work tools," indicates that workers rarely get injured from work tools. Question 13, "My eyes have been irritated by dust while working," shows that workers predominantly often experience eye irritation from dust. Meanwhile, Question 9, "After the casting process, my hands felt hot and dry," indicates that workers predominantly experience their hands feeling hot and dry very frequently after performing casting work.

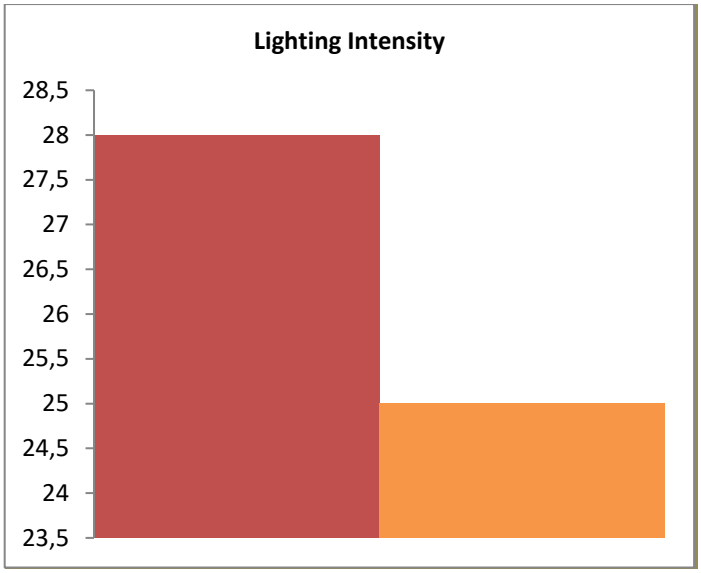

Figure 2. Lighting Variable Categories

Figure 2 shows that the lighting measurement results indicate that 28 respondents (52.8%) received lighting intensity classified as "Below Standard," while 25 respondents (47.2%) received lighting intensity classified as "Meets Standard"

Table 1. Relationship Between Lighting and Minor Injury

lighting	Minor Injury				Total		OR	P-value
	Low		Hight					
	N	%	N	%	N	%		
Below Standard	20	71,4	8	28,6	28	52,8	3,750	0,021
Meets Standard	10	40	15	60	25	47,1		

The Chi-Square test results yielded a p-value of 0.021, which is less than the alpha (α) value of 0.05. Therefore, it can be concluded that there is a relationship between lighting and the occurrence of minor injuries among construction workers. The analysis also obtained an Odds Ratio (OR) of 3.750, meaning that workers who perform tasks under lighting conditions below the standard have 3.750 times the likelihood of experiencing minor injuries.

Table 1. Relationship Between Overtime Work and Minor Injury

Overtime work	Minor Injury				Total		OR	P-value
	Low		hight					
	N	%	N	%	N	%		
Below Standard	21	70	9	30	30	56,6	3,63	0,02
Meets Standard	9	39,1	14	60,9	23	43,4		

The Chi-Square test results yielded a p-value of 0.025, which is less than the alpha (α) value of 0.05. Therefore, it can be concluded that there is a relationship between overtime work and the occurrence of minor injuries among construction workers at PT. Adhi Karya's Glapan Timur Irrigation Rehabilitation Project. The analysis also obtained an Odds Ratio (OR) of 3.630, meaning that workers who engage in overtime beyond the standard duration have 3.630 times the likelihood of experiencing minor injuries.

Discussion

In this study, lighting refers to the intensity of light received by workers while working at night. The categories of lighting in this study are below standard (<100 lux) and meets standard (>100 lux). Bivariate analysis results to determine the relationship between lighting and minor injuries indicate a p-value of 0.021, which allows us to conclude that there is a relationship between lighting and minor injuries among construction workers at PT. Adhi Karya's Glapan Timur Irrigation Rehabilitation Project.

The findings of this study align with research conducted by Supriyanto, which found a relationship between lighting intensity and workplace accidents. The study showed that 75.9% of workers did not receive lighting intensity meeting the standard and mentioned that lighting intensity is the most significant risk factor for workplace accidents (10). Research by Dicky Kurniawan Triyanto also indicates a relationship between lighting and workplace accidents, noting varying lighting intensities depending on the workers' locations, supported by both artificial and natural lighting(11).

However, these results are not consistent with the study by Bimo Ikhrar Bakti, which found no relationship between lighting and workplace accidents, as the lighting measurements met the standards (12). Similarly, Marlinang I. Silalahi's research found no relationship between lighting and workplace accidents, attributing this to compliance with lighting standards at construction sites.

Suma'mur emphasizes that lighting is a critical aspect of the workplace, and problems arise when lighting intensity does not meet standards (10). Poor lighting conditions can contribute to workplace accidents due to reduced worker visibility.

At the East Lumpur Basin Project site, 52.8% of workers working at night did not receive lighting intensity that met the standards. During overtime, the worksite was only equipped with one light for one to two work segments. Each work segment is 6 meters long with a width of 4 meters, resulting in varying lighting measurements depending on the workers' locations. Both standard and non-standard lighting conditions pose risks for workplace accidents, suggesting that insufficient caution during work activities may be a contributing factor. (11)

Overtime work in this study refers to the duration workers spend working at night. Overtime work is categorized into two groups: non-standard (>4 hours) and standard (≤4 hours). Bivariate analysis to determine the relationship between overtime work and minor injuries yielded a p-value of 0.025, indicating a relationship between overtime work and minor injuries among construction workers at PT. Adhi Karya's Glapan Timur Irrigation Rehabilitation Project.

This finding aligns with research by Dalliantika Muthia Zahra, which found a relationship between work duration and minor injuries. The study showed that 73.3% of workers with longer work durations experienced minor injuries, highlighting work duration as a significant factor (13). Dicky Kurniawan Triyanto's research also found a relationship between work duration and workplace accidents, noting that long working hours and insufficient rest can trigger workplace accidents (11).

Conversely, Annisa Fitriani's study found no relationship between work duration and minor injuries at a tofu factory in Semarang. While work duration can affect minor injury occurrences, it must be understood in the context of job factors or characteristics affecting minor injury incidents (14). Similarly, Nisatin Asilah's research indicated no relationship between work duration and workplace accidents at a tofu factory, as the study site did not meet work duration standards (15).

Extended work durations can affect workers, with work time depending on their capabilities and physical condition. Muscle, vision, and respiratory systems degrade after more than 8 hours of work per day, increasing fatigue and accident risk (13). Suma'mur's statement supports the notion that work duration affects workplace accidents. This is consistent with the Loss Causation Models theory, which identifies work duration as a factor influencing workplace accidents (14). At the East Lumpur Basin Project site, 43.3% of workers worked overtime beyond the standard, similar to Dicky Kurniawan Triyanto's study, where 41.9% of workers worked beyond the standard, showing a

relationship between lighting and workplace accidents. This study's bivariate analysis also reveals a relationship between work duration and minor injuries.

Conclusion

Based on the analysis of the relationship between overtime work, lighting, and dust exposure on minor injuries among construction workers at PT. Adhi Karya's Glapan Timur Irrigation Rehabilitation Project, the following conclusions can be drawn: 1. The majority of workers at PT. Adhi Karya's Glapan Timur Irrigation Rehabilitation Project are in the age range of 26-35 years, with 15 respondents (28.3%), and the most common length of employment is between 01-10 years, with 21 respondents (39.6%). 2. There is a relationship between overtime work and minor injuries among construction workers at PT. Adhi Karya's Glapan Timur Irrigation Rehabilitation Project. 3. There is a relationship between lighting and minor injuries among construction workers at PT. Adhi Karya's Glapan Timur Irrigation Rehabilitation Project.

References

[1] Rafindadi AD u., Shafiq N, Othman I, Ibrahim A, Aliyu MM, Mikić M, et al. Data mining of the essential causes of different types of fatal construction accidents. Heliyon. 2023 Feb 1;9(2):e13389.

[2] OSHA. Commonly Used Statistics | Occupational Safety and Health Administration [Internet]. 2020 [cited 2023 Jul 13]. Available from: https://www.osha.gov/data/commonstats

[3] Putri DN, Lestari F. Analisis Penyebab Kecelakaan Kerja Pada Pekerja di Proyek Konstruksi : Literatur Review. J Kesehat Masy [Internet]. 2023 Jun 1 [cited 2023 Jul 12];7(1):444–60. Available from: http://journal.universitaspahlawan.ac.id/index.php/prepotif/article/view/13281

[4] Lander F, Nielsen KJ, Lauritsen J. Work injury trends during the last three decades in the construction industry. Saf Sci. 2016 Jun 1;85:60–6.

[5] Nurhadi A. Perbandingan Produktivitas Tenaga Kerja Konstruksi pada Jam Kerja Reguler dan Jam Kerja Lembur pada Pembangunan Gedung Bertingkat di Surabaya. Rekayasa Tek Sipil. 2015;1(1):27–32.

[6] Indonesia PR. PERPU No. 2 Tahun 2022 [Internet]. [cited 2023 Jul 13]. Available from: https://peraturan.bpk.go.id/Home/Details/234926/perpu-no-2-tahun-2022

[7] Sumarningsih T. Pengaruh Kerja Lembur pada Produktivitas Tenaga Kerja Konstruksi. Media Komun Tek Sipil. 2014;20(1):63–9.

[8] Isniyani R, Rubi Ginanjar D, Studi Kesehatan Masyarakat P, Ilmu Kesehatan Universitas Ibn Khaldun Bogor F, Kesehatan Dan Keselamatan Kerja K, Ilmu Kesehatan F. Intensitas Pencahayaan Dengan Kejadian Kecelakaan Kerja Pada Pekerja Koperasi Karyawan Indokarlo Perkasa Di Bagian Produksi Tahun 2018. PROMOTOR [Internet]. 2019 Aug 1 [cited 2023 Jul 13];2(4):301–7. Available from: https://ejournal.uika-bogor.ac.id/index.php/PROMOTOR/article/view/2243

[9] Rakyat KPU dan P. Surat Edaran Menteri nomor 10/SE/M/2022 [Internet]. 2022 [cited 2023 Jul 14]. Available from: https://jdih.pu.go.id/detail-dokumen/2958/1#div_cari_detail

[10] Supriyanto, Isniyani R, Ginanjar R. Intensitas Pencahayaan Dengan Kejadian Kecelakaan Kerja Pada Pekerja Koperasi Karyawan Indokarlo Perkasa Di Bagian Produksi Tahun 2018. J Mhs Kesehat Masy. 2019;2(4):301–7.

[11] Triyanto DK. Hubungan Antara Intensitas Pencahayaan Dengan Kecelakaan Kerja Pada Pekerja Konveksi Di Kota Makassar Tahun 2018. 2018.

[12] Bhakti BI. Pengaruh Faktor Lingkungan Fisik Kerja terhadap Kejadian Kecelakaan Kerja pada

Pekerja Aluminium di Kelurahan Gadang Kota Malang. Kesehat Lingkungan, Stikest Widyagama Husada. 2020;

[13] Zahra DM, Suwondo A, Lestantyo D. Hubungan Kualitas Tidur, Lama Kerja, Dan Kelelahan Mata Terhadap Kejadian Minor Injury Di Industri Rumahan Sepatu Kulit Lacosta Desta Shoes. J Kesehat Masy. 2020;8(6):812–8.

[14] Fitriani A, Ekawati, Wahyuni I. Hubungan Durasi Kerja, Beban Kerja Fisik, dan Kelelahan Kerja Terhadap terjadinya Kejadian Minor Injury pada Pabrik tahu X Kota Semarang. J Kesehat Masy. 2021;9(1):32–7.

[15] Asilah N, Yuantari MGC. Analisis Faktor Kejadian Kecelakaan Kerja pada Pekerja Industri Tahu. J Penelit dan Pengemb Kesehat Masy Indones. 2020;1(1):1–10.